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Huang

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- (54) **OPTICAL FIBER COUPLING CONNECTOR**
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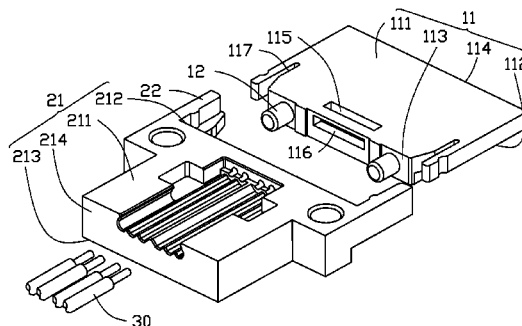
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(57) **ABSTRACT**

An optical fiber coupling connector includes an optical coupling lens and a jumper. The optical coupling lens includes a first body having a first top surface and a connected first mounting surface, two plugs protruding from the first mounting surface, and two sliders. The first mounting surface defines two buffer gaps. Each slider is located at one side of a buffer gap away from the first body and defines an engagement groove facing away from the first body. The jumper includes a second body having a second mounting surface and two clamping arms protruding from the second mounting surface. The second mounting surface faces the first mounting surface and defines two plug holes for receiving the plugs. Each clamping arm defines a slide groove with an engagement portion protruding toward the other slide groove. Each engagement portion engages in an engagement groove.

15 Claims, 5 Drawing Sheets



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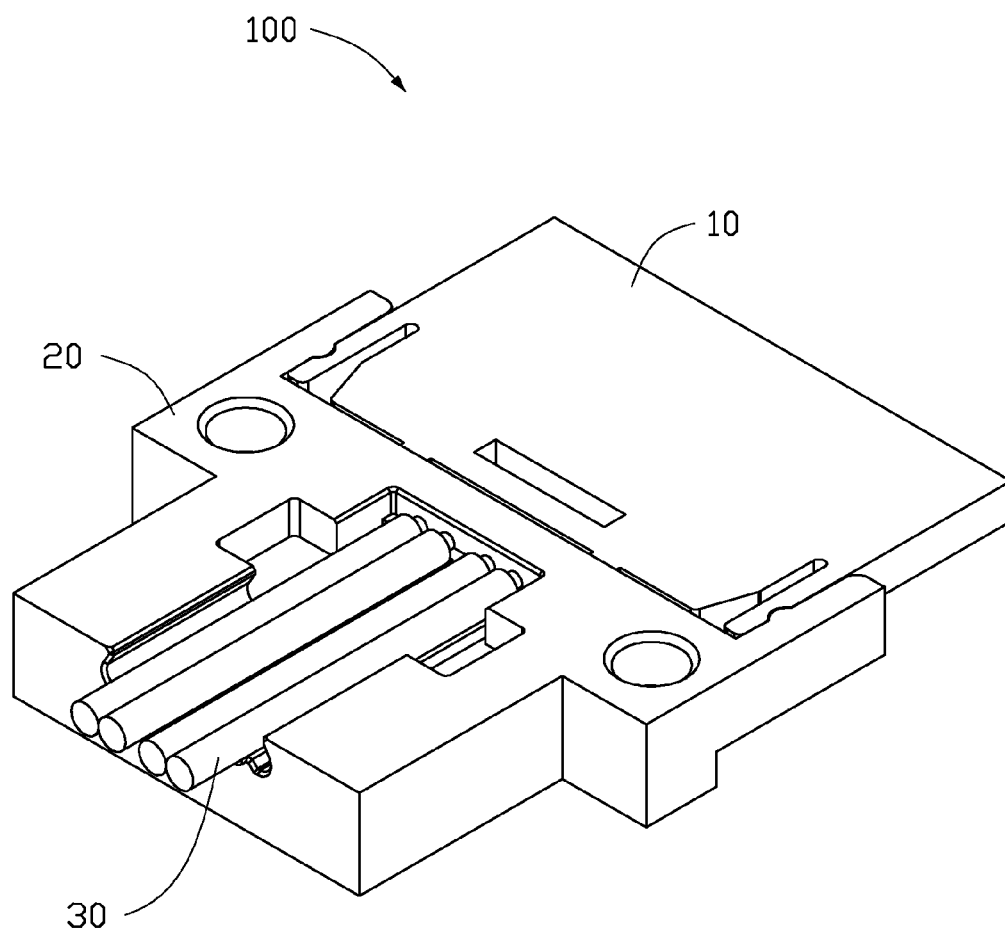


FIG. 1

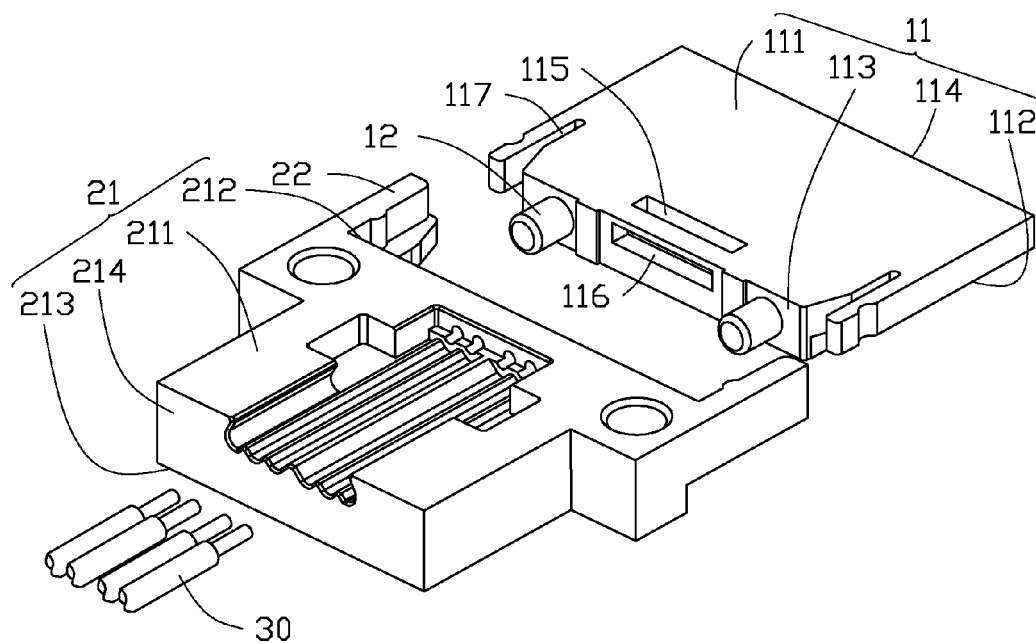


FIG. 2

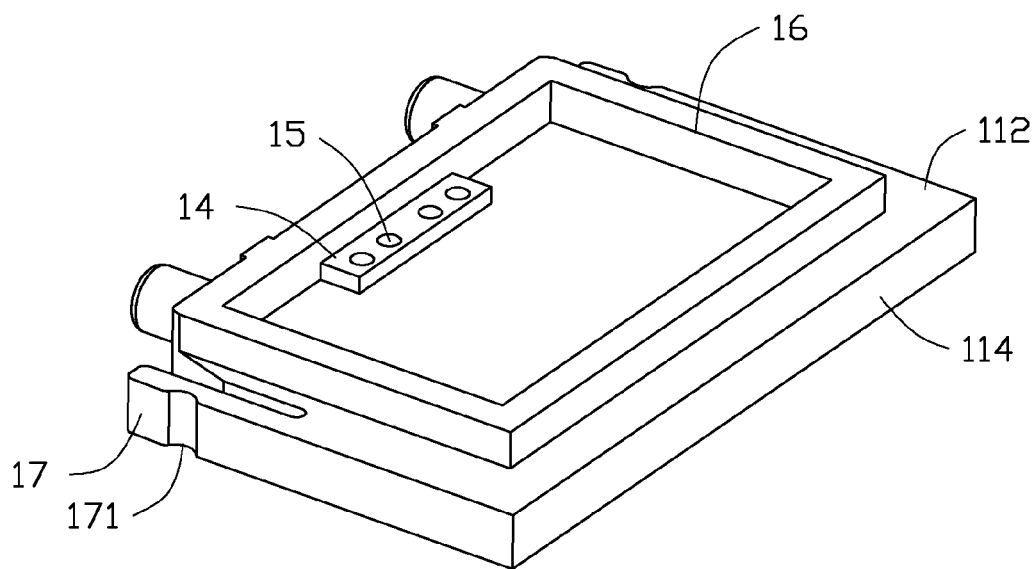


FIG. 3

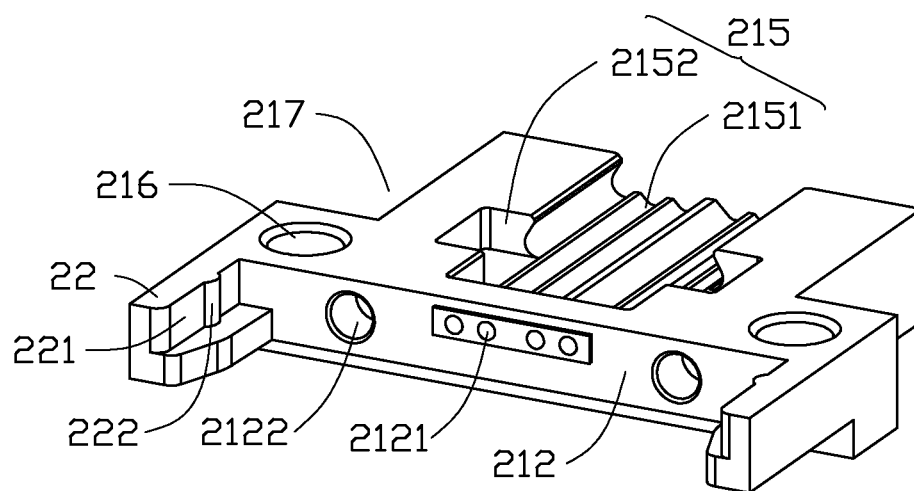


FIG. 4

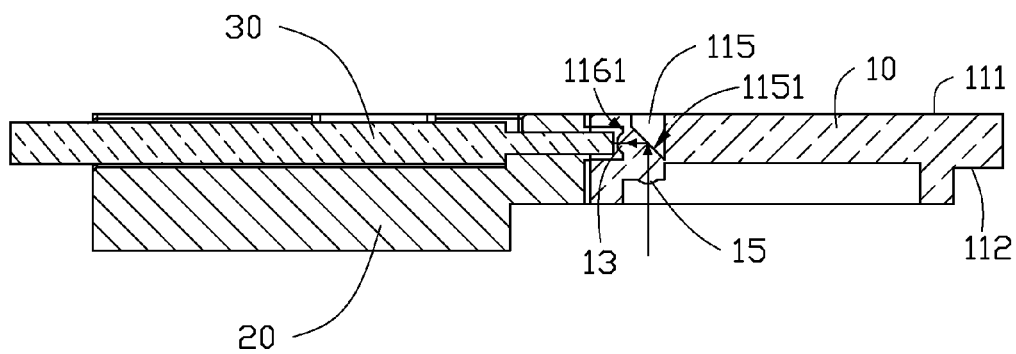


FIG. 5

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OPTICAL FIBER COUPLING CONNECTOR

FIELD

The subject matter herein generally relates to an optical fiber coupling connector.

BACKGROUND

An optical fiber coupling connector includes an optical coupling lens and a jumper. The optical coupling lens is inserted into the jumper. A plurality of fastening members, such as screws and bolts, are used to enhance the fastening of the optical coupling lens and the jumper.

BRIEF DESCRIPTION OF THE DRAWINGS

Implementations of the present technology will now be described, by way of example only, with reference to the attached figures.

FIG. 1 is an isometric view of an embodiment of an optical fiber coupling connector, including an optical coupling lens, a jumper, and a plurality of optical fibers.

FIG. 2 is an exploded view of the optical fiber coupling connector of FIG. 1.

FIG. 3 is an isometric view of the optical coupling lens of FIG. 2, but viewed from another aspect.

FIG. 4 is an isometric view of the jumper of FIG. 2, but viewed from another aspect.

FIG. 5 is a cross-sectional view of the optical fiber coupling connector of FIG. 1 taken along a V-V line.

DETAILED DESCRIPTION

It will be appreciated that for simplicity and clarity of illustration, where appropriate, reference numerals have been repeated among the different figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein can be practiced without these specific details. In other instances, methods, procedures and components have not been described in detail so as not to obscure the related relevant feature being described. Also, the description is not to be considered as limiting the scope of the embodiments described herein. The drawings are not necessarily to scale and the proportions of certain parts have been exaggerated to better illustrate details and features of the present disclosure.

Several definitions that apply throughout this disclosure will now be presented.

The term “coupled” is defined as connected, whether directly or indirectly through intervening components, and is not necessarily limited to physical connections. The connection can be such that the objects are permanently connected or releasably connected. The term “substantially” is defined to be essentially conforming to the particular dimension, shape or other word that substantially modifies, such that the component need not be exact. For example, substantially cylindrical means that the object resembles a cylinder, but can have one or more deviations from a true cylinder. The term “comprising,” when utilized, means “including, but not necessarily limited to”; it specifically indicates open-ended inclusion or membership in the so-described combination, group, series and the like.

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The present disclosure is described in relation to an optical fiber coupling connector. The optical fiber coupling connector comprises an optical coupling lens and a jumper. The optical coupling lens comprises a first body, two plugs, and two sliders. The first body comprises a first top surface and a first mounting surface perpendicularly connected to the first top surface. The first mounting surface defines two buffer gaps. The plugs protrude from the first mounting surface. The plugs are located between the two buffer gaps. The sliders correspond to the buffer gaps. Each slider is located at one side of the corresponding buffer gap away from the first body. Each slider defines an engagement groove facing away from the corresponding buffer gap. The jumper is coupled with the optical coupling lens. The jumper comprises a second body and two clamping arms. The second body comprises a second mounting surface. The second mounting surface faces the first mounting surface. The second mounting surface defines two plug holes. The plug holes are configured to receiving the two plugs respectively. The clamping arms protrude from opposite sides of the second mounting surface toward the first mounting surface. Each clamping arm defines a slide groove corresponding to a slider. An engagement portion protrudes from an inner surface of each slide groove toward the other slide groove. Each engagement portion corresponds to and engages in an engagement groove.

FIG. 1 illustrates an embodiment of an optical fiber coupling connector 100. The optical fiber coupling connector 100 includes an optical coupling lens 10, a jumper 20, and a plurality of optical fibers 30.

FIGS. 1-3 and 5 illustrate that the optical coupling lens 10 includes a first body 11, two plugs 12, four first converging members 13, a protrusion 14, four second converging members 15, a supporting member 16, and two sliders 17.

FIGS. 2 and 5 illustrate that the first body 11 includes a first top surface 111, a first mounting surface 113, a first bottom surface 112, and a first rear surface 114. The first top surface 111 and the first bottom surface 112 are positioned at opposite sides of the first body 11, and are substantially parallel to each other. The first mounting surface 113 and the first rear surface 114 are positioned at opposite sides of the first body 11, and are substantially parallel to each other. The mounting surface 113 is substantially perpendicularly interconnected between the first top surface 111 and the first bottom surface 112. The first mounting surface 113 extends from the first top surface 111 to the first bottom surface 112. The first top surface 111 defines a first recess 115. The first body 11 further includes an inner reflective surface 1151 at the bottom of the first recess 115. An included angle between a main plane of the first top surface 111 and a main plane of the inner reflective surface 1151 is about 45 degrees. An included angle between a main plane of the first mounting surface 113 and a main plane of the inner reflective surface 1151 is about 45 degrees. The first mounting surface 113 defines a second recess 116 and two buffer gaps 117. The second recess 116 is located at a central portion of the first mounting surface 113. The first body 11 further includes a first optical surface 1161 in the second recess 116. The first optical surface 1161 is substantially parallel to the first mounting surface 113. The first optical surface 1161 faces the inner reflective surface 1151 and is substantially perpendicular to the first top surface 111. The two buffer gaps 117 are located at opposite sides of the second recess 116. Each of the two buffer gaps 117 is defined in the first body 11 between the first top surface 111 and the first bottom surface 112, and extends substantially perpendicularly inward the first body 11 from the first mounting surface 113.

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The two plugs **12** protrude substantially perpendicularly from the first mounting surface **111** toward a same direction. The two plugs **12** are located between the two buffer gaps **117** and at opposite sides of the second recess **116**.

The first converging members **13** are located inside the second recess **116** and are arranged on the first optical surface **1161**. In one embodiment, the first converging members **13** can be convex lenses.

FIG. 3 illustrates that the protrusion **14** protrudes from the first bottom surface **112** along a direction away from the first top surface **111**. The protrusion **14** includes a second optical surface **141**. The second optical surface **141** faces the inner reflective surface **1151**. In one embodiment, the second optical surface **141** is substantially parallel to the first bottom surface **112**.

The second converging members **15** are arranged on the second optical surface **141**. Each second converging member **15** is optically aligned with a first converging member **13**. In one embodiment, the second converging members **15** can be convex lenses.

The supporting member **16** protrudes from the first bottom surface **112** along a direction away from the first top surface **111**. In one embodiment, the supporting member **16** is a substantially annular bulge. An area surrounded by the supporting member **16** is smaller than the area of the first bottom surface **112**. The protrusion **14** is surrounded by the supporting member **16**. In one embodiment, the protrusion **14** and the supporting member **16** form a unitary configuration.

Each slider **17** corresponds to a buffer gap **117** and is located at one side of a corresponding buffer gap **117** away from the first body **11**. That is, each slider **17** is formed between a corresponding buffer gap **117** and a side surface of the first body **11**, and the side surface of the first body **11** is perpendicular to the first mounting surface **113**, the first top surface **111**, and the first bottom surface **112**. Each slider **17** defines an engagement groove **171** opposite the corresponding buffer gap **117**. In one embodiment, each engagement groove **171** is substantially semi-cylindrical shaped and a central axis is substantially perpendicular to the first top surface **111**.

FIGS. 1-2 and 4 illustrate that the jumper **20** includes a second body **21** and two clamping arms **22**.

FIGS. 2 and 4 illustrate that the second body **21** includes a second top surface **211**, a second mounting surface **212**, a second bottom surface **213**, and a second rear surface **214**. The second top surface **211** and the second bottom surface **213** are positioned at opposite sides of the second body **21**, and are substantially parallel to each other. The second mounting surface **212** and the second rear surface **214** are positioned at opposite sides of the second body **21** and are substantially parallel to each other. The second mounting surface **212** and the second rear surface **214** extend from the second top surface **211** to the second bottom surface **213**. The second mounting surface **212** is substantially perpendicularly interconnected between the second top surface **211** and the second bottom surface **213**. The second top surface **211** defines a receiving groove **215** and two positioning portions **216**. The receiving groove **215** extends towards and passes through the second rear surface **214**. A bottom of the receiving groove **215** defines four receiving gaps **2151**. Two first openings **2152** are defined in the second top surface **211** at opposite sides of the receiving groove **215**. The first openings **2152** are coupled with the receiving groove **215**. The positioning portions **216** are located at opposite sides of the receiving groove **215**.

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In one embodiment, the second body **21** is substantially T shaped. Two second openings **217** are defined at opposite sides of the second body **21**. Each second opening **217** corresponds to a first opening **2152** facing away from the other second opening **217**. Each second opening **217** passes through the second top surface **211**, the second bottom surface **213**, and the second rear surface **214**.

The second mounting surface **212** faces the first mounting surface **113** and defines four receiving holes **2121** located at a central portion of the second mounting surface **212**. Each receiving hole **2121** corresponds to a first converging member **13**. The receiving holes **2121** are coupled with the receiving groove **215** and are aligned with the receiving gaps **2151** respectively. The second mounting surface **212** also defines two plug holes **2122** located at opposite sides of the receiving holes **2121**. The two plug holes **2122** correspond to the two plugs **2121**. Each plug hole **2122** is configured to receive a corresponding plug **12**.

The two clamping arms **22** extend substantially perpendicularly out from opposite ends of the second mounting surface **212** toward the first mounting surface **113**. The two sliders **17** are engagable with the two clamping arms **22** connecting the first body **11** to the second body **21**. The two clamping arms **22** are located at opposite sides of the two plug holes **2122**. Each clamping arm **22** defines a slide groove **221**. Each slide groove **221** faces the other slide groove **221**. An engagement portion **222** protrudes from an inner surface of each slide groove **221** toward the other slide groove **221**. Each engagement portion **222** corresponds to an engagement groove **171**. In one embodiment, each engagement portion **222** is substantially semicylindrical.

FIGS. 1 and 2 illustrate that when in assembly, each slider **17** slides along a corresponding slide groove **221**. Each plug **12** is inserted into a corresponding plug hole **2122**. Each engagement portion **222** engages in a corresponding engagement groove **171**, and is secured in the corresponding engagement groove **171**. The optical fibers **30** are received in the receiving gaps **2151** respectively. Each optical fiber **30** passes through a receiving hole **2121** corresponding to the receiving gap **2151** and extends into the second recess **116**. Each optical fiber **30** is aligned with a first converging member **13**.

FIG. 5 illustrates that when working, light reaching the second converging members **15** converges into parallel light. The parallel light enters the optical coupling lens **10** through the second converging members **15** toward the inner reflective surface **1151**. The parallel light is reflected by the inner reflective surface **1151** toward the corresponding first converging members **13**. The parallel light emits out of the optical coupling lens **10** through the first converging members **13** toward the aligned optical fibers **30**.

The embodiments shown and described above are only examples. Many details are often found in the art such as the other features of an optical fiber coupling connector. Therefore, many such details are neither shown nor described. Even though numerous characteristics and advantages of the present technology have been set forth in the foregoing description, together with details of the structure and function of the present disclosure, the disclosure is illustrative only, and changes may be made in the detail, especially in matters of shape, size and arrangement of the parts within the principles of the present disclosure up to, and including the full extent established by the broad general meaning of the terms used in the claims. It will therefore be appreciated that the embodiments described above may be modified within the scope of the claims.

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What is claimed is:

1. An optical fiber coupling connector comprising:
an optical coupling lens comprising a first body, two
plugs, and two sliders, the first body comprising a first
top surface and a first mounting surface perpendicularly
connected to the first top surface, the first mounting
surface defining two buffer gaps, the plugs protruding
from the first mounting surface and located between the
two buffer gaps, the sliders corresponding to the buffer
gaps, each slider being located at one side of the
corresponding buffer gap away from the first body, each
slider defining an engagement groove facing away from
the corresponding buffer gap; and
a jumper connectable to the optical coupling lens, com-
prising a second body and two clamping arms, the
second body comprising a second mounting surface
entirely facing the first mounting surface, the second
mounting surface defining two plug holes configured to
receive the two plugs respectively, the clamping arms
located at opposite sides of the second mounting sur-
face and connected to the second mounting surface
directly, the clamping arms protruding from the second
mounting surface toward the first mounting surface,
each clamping arm defining a slide groove correspond-
ing to a slider, an engagement portion protruding from
an inner surface of each slide groove toward the other
slide groove, and each engagement portion engaging in
an engagement groove connecting the jumper to the
optical coupling lens.
2. The optical fiber coupling connector of claim 1,
wherein the first top surface defines a first recess, the first
body further comprises an inner reflective surface at the
bottom of the first recess.
3. The optical fiber coupling connector of claim 2,
wherein an included angle between a main plane of the inner
reflective surface and a main plane of the first top surface is
about 45 degrees, and an included angle between a main
plane of the inner reflective surface and a main plane of the
first mounting surface is about 45 degrees.
4. The optical fiber coupling connector of claim 2,
wherein the first mounting surface defines a second recess
located at a central portion of the first mounting surface, the
second recess is located between the two plugs, and the first
body further comprises a first optical surface in the second
recess, the first optical surface faces the inner reflective
surface.
5. The optical fiber coupling connector of claim 4,
wherein the optical coupling lens further comprises a plu-
rality of first converging members, and the first converging
members are located inside the second recess and are
arranged on the first optical surface.
6. The optical fiber coupling connector of claim 5,
wherein the first body further comprises a first bottom
surface and a first rear surface, the first top surface and the
first bottom surface are positioned at opposite sides of the

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first body and are parallel to each other, and the first
mounting surface and the first rear surface are positioned at
opposite sides of the first body and are parallel to each other.

7. The optical fiber coupling connector of claim 6,
wherein the optical coupling lens further comprises a plu-
rality of second converging members, the second converging
members are located at the first bottom surface, and the
second converging members face the inner reflective surface
and correspond to the first converging members respectively.

8. The optical fiber coupling connector of claim 7,
wherein the optical coupling lens further comprises a pro-
trusion, the protrusion protrudes from the first bottom sur-
face, the protrusion comprises a second optical surface, the
second optical surface faces the inner reflective surface, and
the second converging members are arranged on the second
optical surface.

9. The optical fiber coupling connector of claim 7,
wherein the optical coupling lens further comprises a sup-
porting member, and the supporting member protrudes from
the first bottom surface along a direction away from the first
top surface.

10. The optical fiber coupling connector of claim 9,
wherein the supporting member is an annular bulge, and the
protrusion is surrounded by the supporting member.

11. The optical fiber coupling connector of claim 5,
wherein the second mounting surface defines a plurality of
receiving holes, the receiving holes correspond to the first
converging members respectively, and the receiving holes
are located between the two plug holes.

12. The optical fiber coupling connector of claim 11,
wherein the second body comprises a second top surface
perpendicularly connected to the second mounting surface,
the second top surface defines a receiving groove, and the
receiving groove is coupled with the receiving holes.

13. The optical fiber coupling connector of claim 12,
wherein a plurality of receiving gaps are defined at the
bottom of the receiving groove, and the receiving gaps are
aligned with the receiving holes respectively.

14. The optical fiber coupling connector of claim 13,
wherein two first openings are defined in the second top
surface at opposite sides of the receiving groove, and the
first openings are coupled with the receiving groove.

15. The optical fiber coupling connector of claim 14,
wherein the second body further comprises a second bottom
surface and a second rear surface, the second top surface and
the second bottom surface are positioned at opposite sides of
the second body and parallel to each other, the second
mounting surface and the second rear surface are positioned
at opposite sides of the second body and are parallel to each
other, two second openings are defined at opposite sides of
the second body, and the second openings pass through the
second top surface, the second bottom surface, and the
second rear surface.

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